

REMARKS/ARGUMENTS

Claims 1-13 are pending. Claims 12 and 13 have been added.

The Examiner rejected Claims 1-11 under 35 U.S.C. §103(a) as being unpatentable over Arata et al. WO 00/37579 (applying U.S. Patent No. 6,558,797 to Arata et al. as its equivalent, hereinafter referred to as "Arata et al. '797") in view of GB 2,362,037 to Ongkosit ("Ongkosit '037") and further in view of JP 2000-154232 to Ekusa et al. ("Ekusa et al. '232").

Independent Claim 1 calls for:

An epoxy resin composition for a printed wiring board, comprising:
an epoxy resin, a phenol novolac resin and a curing accelerator,
said epoxy resin comprises an epoxy (a) and an epoxy (b),
wherein **the epoxy (a) is a brominated epoxy resin**,
obtainable by reacting/mixing a bisphenol A epoxy resin with
tetrabromobisphenol A, said brominated epoxy resin **having an epoxy equivalent of 350 g/eq to 470 g/eq** and containing an n=0 component in a ratio of 20% to 35% in terms of area percentage in a GPC chart; and
the epoxy (b) is one or more of bifunctional epoxy resins,
obtainable by reacting epichlorohydrin with any one selected from the group consisting of bisphenol A, bisphenol F and tetrabromobisphenol A,
said bifunctional epoxy resins having an n=0 component in a content of 60% or higher in terms of area percentage in a GPC chart;
said epoxy (a) and epoxy (b) are contained in total in an amount of 80% to 100% by weight, based on the total weight of the epoxy resin composition;
said epoxy (a) is contained in an amount of 75% to 97% by weight, based on the total weight of the epoxy resin; and
said epoxy resin has a bromine content of 18% to 30% by weight, based on the total weight of the epoxy resin.

Of note, as indicated in **boldface** above, independent Claim 1 calls for an epoxy resin composition including first and second epoxy resins, namely, (i) a brominated epoxy resin (a) and (ii) a bifunctional epoxy resin (b). The brominated epoxy (a) has an epoxy equivalent of 350 g/eq to 470 g/eq. Further, brominated epoxy (a) is contained in an amount of 75% to 97% by weight based and the total weight of brominated epoxy resin (a) and bifunctional epoxy resin (b).

New Claim 12 calls for the brominated epoxy resin (a) to be contained in an amount of 90% to 97% by weight, based on the total weight of the epoxy resin, as in Examples 1-7 of the present application as filed.

New Claim 13 calls for the brominated epoxy resin (a) to have an epoxy equivalent of 427 g/eq to 470 g/eq, as set forth in paragraph [0035] and in Examples 1-7 of the present application as filed.

Arata et al. '797 discloses a composition including "as essential components (a) an epoxy resin, (b) a polyfunctional phenol, (c) a curing accelerator ..., and (d) a compound having a triazine ring or an isocyanuric ring" (col. 2, lines 11-14). The epoxy resin (a) includes one or more of the epoxy resins set forth at col. 2, lines 27-39.

Ekusa et al. '232 discloses a composition that includes three epoxy resins, namely: (i) a bromated epoxy resin (A) having an epoxy equivalent between 200-700, present in an amount of 20-80 wt.% based on the total weight of the epoxy resins ([0008]); (ii) a non-brominated, bisphenol A type epoxy resin (B) present in an amount of 15-30 wt.%, based on the total weight of the epoxy resins ([0009]); and (iii) a novolac epoxy resin (C) present in an amount of 10-50 wt.% based on the total weight of the epoxy resins ([0010]). The Ekusa et al. '232 composition also includes tetrabromobisphenol A (not itself an epoxy resin) present in an amount of 20-50 wt.% based on the total weight of the epoxy resins (A), (B), and (C) ([0011]), and a dicyandiamide curing agent (E).

Ongkosit '037 is directed generally toward a method of manufacturing a multi-layer printed circuit board, and does not include any detail as to the type of resins that may be used other than the composition described at page 3, second full paragraph, which includes only a single epoxy resin, namely, DER530A80. As the Examiner has correlated with paragraph [0035] of the present specification in which DER530A80 is also used, same includes an epoxy equivalent of 427 g/eq and an N=0 component of 28%.

The Examiner's rejection of independent Claim 1 appears to be based on all three of Arata et al. '797, Ekusa et al. '232, and Ongkosit '037, as follows:

The Examiner uses Arata et al. '797 as the base reference in that Arata et al. '797 discloses a composition including one or more epoxy resins, as well as a curing accelerator and a phenol novolac resin, namely, VH-4170 (col. 10, line 66).

The Examiner relies on Ekusa et al. '232 for disclosing a resin composition that includes both a brominated epoxy resin (A) and a non-brominated epoxy resin (B), and notes that the relative amount of the brominated epoxy resin (A) is between 20-80 wt.% of the total of the epoxy resins, which range overlaps the percent of the claimed content of the brominated epoxy (a) of 75% to 95% by weight, based on a total weight of the epoxy resins.

The Examiner relies on Ongkosit '037 for the disclosure of a brominated epoxy, namely, DER530A80, which has an epoxy equivalent of 427 g/eq and an N=0 component 28%, and correlates same to the claimed range for the epoxy equivalent of 350 g/eq to 470 g/eq and N=0 component in an ratio of 20% to 35% as called for in Claim 1 with respect to the brominated epoxy (a). Thus, it appears that the Examiner asserts that one of ordinary skill in the art would select the DER530A80 resin of Ongkosit '037 for the a bromated epoxy resin (A) of Ekusa et al. '232.

For the reasons set forth below, Applicants respectfully submit that independent Claim 1 is not obvious based on the combination of references relied on by the Examiner, because the combination of references taken together would not guide one of ordinary skill in the art, *without knowledge of the present invention*, to formulate a composition by selecting a brominated epoxy resin (a) having an epoxy equivalent within the relatively narrowly defined range of 350 g/eq to 470 g/eq, and using the brominated epoxy resin (a) together with a bifunctional epoxy resin (b) with brominated epoxy resin (a) being present in an amount of 75% to 97% based on the total weight of (a) and (b) to thereby arrive at an epoxy resin having a bromine content of 18% to 30% by weight, based on the total weight of (a) and (b).

First, the Examiner relies on Ekusa et al. '232 for the disclosure that an epoxy composition may include both a brominated epoxy resin (*i.e.*, that of Ongkosit '037) and a non-brominated epoxy resin (*i.e.*, that of Arata et al. '797) and also relies on Ekusa et al. '232 for the relative amount of brominated epoxy resin that is present. Notably, as set forth above, the amount of the brominated epoxy used in the composition of Ekusa et al. '232 is 20-80 wt.% based on the total weight of the three epoxie resins in the Ekusa et al. '232 composition, namely, epoxies (A), (B), and (C).

By contrast, independent Claim 1 calls for the amount of the brominated epoxy (a) as being 75% to 97% based on a total weight of the epoxy resins. Although there is some overlap between these two ranges, the 20-80 wt.% range disclosed in Ekusa et al. '232 is

broad in that it encompasses 60 percentage points, while the claimed range of 75% to 97% is much more narrow in that it encompasses only 22 percentage points. Also, the claimed range actually overlaps the range of Ekusa et al. '232 *by only 5 percentage points*, and then diverges upwardly from the uppermost end of the range disclosed in Ekusa et al. '232, indicating *a much higher content of brominated epoxy* based on total epoxy resin content. In this manner, Ekusa et al. '232 fails to disclose a brominated epoxy resin content with sufficient specificity to anticipate or render obvious Applicants' claimed brominated epoxy resin (a) content. MPEP 2131.03; Atofina v. Great Lakes Chem. Corp., 441 F.3d 991, 999, 78 USPQ2d 1417, 1423 (Fed. Cir. 2006).

Further, it is important to note that the that Ekusa et al. '232 blend includes a *third* epoxy resin (C), namely, a novolak epoxy resin, in an amount of between 10 and 50% based on the total of the epoxy resins. Thus, if the minimum amount of 15 wt.% of the epoxy resin (B) is used together with the minimum amount of 10 wt.% of the epoxy resin (C) in the Ekusa et al. '232 blend, only 75 wt.% remains for the epoxy resin (A), which is at the lowest end of Applicants' claimed range.

Thus, without knowledge of the present invention, one of ordinary skill in the art, in relying on the relative proportions of the epoxy resins disclosed in Ekusa et al. '232, would not formulate an epoxy resin composition to include 75% to 97% of a brominated epoxy resin based on a total weight of the epoxy resins in the composition, as called for in independent Claim 1.

Further, without knowledge of the present invention, one of ordinary skill in the art, in relying on the relative proportions of the epoxy resins disclosed in Ekusa et al. '232, would not formulate an epoxy resin composition to include 90% to 97% of a brominated epoxy resin based on a total weight of the epoxy resins in the composition, as called for in new Claim 12, which depends from independent Claim 1.

Additionally, the epoxy equivalent of 350 g/eq to 470 g/eq called for in independent Claim 1 for the brominated epoxy (a) is a relatively narrowly defined range within the much broader epoxy equivalent range of 200-700 disclosed for the brominated epoxy of Ekusa et al. '232. In this manner, and similar to the above, Ekusa et al. '232 fails to disclose to one of ordinary skill in the art a brominated epoxy having an epoxy equivalent within a range that is disclosed with sufficient specificity to anticipate and/or render obvious independent Claim 1.

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MPEP 2131.03; Atofina v. Great Lakes Chem. Corp., 441 F.3d 991, 999, 78 USPQ2d 1417, 1423 (Fed. Cir. 2006).

New dependent Claim 13 calls for a still more narrow epoxy equivalent range for the brominated epoxy (a), namely, 427 g/eq to 470 g/eq.

Still further, independent Claim 1 calls for the epoxy resin to have a bromine content of 18% to 30%, again, a relatively narrow range that the Examiner does not state would be met by a composition formulated based on the relative amounts of brominated epoxy resins and non-brominated epoxy resins disclosed by Ekusa et al. '232. In fact, given the relatively low amount of 20-80 wt.% of brominated epoxy resin (A) in the Ekusa et al. '232 composition as a percent of the total epoxy resin content as compared to the relatively greater claimed amount of 75% to 97% of brominated epoxy (a) as a percent of the total epoxy resin content, one of ordinary skill in the art, without knowledge of the present invention would have no teaching, guidance, or motivation to target the formulation of Ekusa et al. '232 such that the composition would have the claimed bromine content of 18% to 30% based on the weight of all epoxy resins.

By contrast, Applicants have discovered that when an epoxy resin composition is formulated according to the particular parameters called for in independent Claim 1, such compositions may advantageously be used to form printed wiring board prepgs having a good appearance, as well as an excellent combination of thermal decomposition temperature, heat resistance, fire retardancy, and glass transition temperature, as indicated in the Working Examples of the present application.

For the foregoing reasons, Applicants respectfully submit that independent Claim 1 is not obvious over Arata et al. '797 in combination with Ekusa et al. '232 and Ongkosit '037.

It is believed that the above represents a complete response to the Official Action and reconsideration is requested. Specifically, Applicants respectfully submit that the application is in condition for allowance and respectfully requests allowance thereof.

In the event Applicants have overlooked the need for an additional extension of time, payment of fee, or additional payment of fee, Applicants hereby petition therefor and authorize that any charges be made to Deposit Account No. 02-0385, Baker & Daniels LLP.

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Should the Examiner have any further questions regarding any of the foregoing, the Examiner is respectfully invited to telephone the undersigned at 260-424-8000.

Respectfully submitted,



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